# SYSTEMS AND METHODS FOR MULTIMEDIA MESSAGING IN A CABLE OR SATELLITE SUBSCRIBER SYSTEM

## RELATED APPLICATIONS

This applications claims priority to U.S. Provisional Application No. 60/143,835, entitled "Framework, Mechanism, and User-Interface for Multimedia Messaging in a Cable or Satellite Subscriber Network," filed July 14, 1999.

## FIELD OF THE INVENTION

The present invention generally relates to a subscriber television system, such as cable and satellite subscriber systems, and more particularly, to multimedia messaging in such systems.

## BACKGROUND OF THE INVENTION

The number of households receiving cable or satellite subscriber services continues to increase year to year. This trend is expected to continue, especially with the recent advent of digital television. Digital television systems enable two-way and advanced one-way communications between the subscriber and the system headend. As a consequence, interactive services such as e-mail, interactive programming guides, advanced configuration controls, impulse pay-per-view, video-on-demand, e-commerce, and web browsing may be provided to subscribers of a digital television system. In addition to the interactive services, the increased bandwidth available through a digital television system has made it possible for the subscriber to have access to hundreds, or even thousands, of channels and/or services. Further, the increased bandwidth enables services such as virtual or text channels to become more complex as they may be enhanced by graphical images, audio, and other multimedia content. New multimedia services such as Emergency Alert System (EAS) notifications,

e-mail, messaging from operator-to-user or user-to-user also become possible.

While advancements in certain technologies have expanded the complexity and type of services that can be provided over cable and satellite systems, there are still constraints within these systems that may limit the utilization of these emerging technologies. For instance, the non-functional requirements regarding performance and memory consumption are generally viewed as limiting factors in the design and implementation of new services which take advantage of these new technological advancements.

For example, a set-top box, also referred to as a home communication terminal (HCT), is located at a user site for connecting to and interfacing with a subscriber television system, such as a cable or satellite system. For purposes of the present disclosure, set-top boxes, HCT's and other similar devices are collectively referred to herein as communication terminals. Most communication terminals are typically designed to meet the minimum specifications for providing a certain level of functionality. Some of the more common limitations are the amount of volatile memory (*e.g.*, random access memory), the amount of non-volatile memory (*e.g.*, NVRAM and the hard disk), and the performance of the processor (*e.g.*, the processor clock speed and design). These limitations are generally governed by the per unit cost of a communication terminal which is preferably kept low in order to be as competitive as possible. Thus, it is desirable to conserve and reuse certain functionality whenever practical within the architecture of the cable or satellite system, and in particular, at the communication terminal.

In addition, the development of new services is costly, and therefore, the sharing of functionality between services that are executed at the communication terminal and/or the headend may not only reduce the associated overhead in terms of memory, processor time and bandwidth, but may reduce the software development cost as well. Yet further, the management of the user interface at the communication terminal has generally become much more complex as multiple program services compete for presentation to the user.

Many of the new multimedia services, as well as existing services, provide for messaging, such as text presented by a virtual or text channel, a tuned channel, or as part of emergency services such as EAS notifications. Other types of messaging within a cable or satellite system may include service provider-to-user or user-to-user messaging. However, current services typically perform these messaging functions independent of one another. As

a result, resources such as processing power, bandwidth, and software development time and cost may be unnecessarily expended if multiple services are performing essentially the same messaging functions in parallel over the same television system.

Therefore, an unsatisfied need exists in the industry for more efficient utilization of resources in development and implementation of messaging in cable and satellite systems.

## SUMMARY OF THE INVENTION

The present invention provides for customizable, multimedia messaging over a subscriber television system utilizing a service independent framework. The present invention comprises a multimedia messaging (MMM) server generally located at a headend of a cable or satellite system, and an MMM client at a communication terminal located remotely with respect to the MMM server. Service providers and operators of the cable or satellite system can define a message configuration that is utilized to present message content to a subscriber. The message configuration includes parameters which control the presentation of the message content. The message configuration is application independent so as to be compatible with multiple services provided by the cable or satellite system. For instance, services such as Emergency Alert System (EAS), HTML-based virtual channels, or subscriber messaging can generate and present multimedia messages to users in a predefined format such as a scrolling ticker-tape, banner, pop-up window, full screen HTML-formatted text and images, or pop-up ticker with an associated audio message. The message configuration also is extendible to support parameters for virtually any content format.

Accordingly, the present invention advantageously enables multiple services to define message configurations and generate multimedia messages based on the message configurations for delivery to a user(s) utilizing a common MMM server. The MMM server efficiently delivers the message content and the message configuration typically in the form of an MMM request to one or more MMM clients. The MMM requests can be individual addressed or broadcast to the MMM clients, or the requests can be pre-defined services assigned to channels and triggered by the resident navigation application on the communications terminal when the terminal user tunes to the channel. Further, the MMM requests do not necessarily include the message configuration or the message content of the multimedia message, thereby conserving system bandwidth. The MMM request may include

one or more location references that can be utilized to retrieve either or both of the message configuration and message content for execution of the MMM request by the MMM client. The sharing of the multimedia messaging functionality of a common MMM server by multiple services reduces the software development efforts of the various services since they do not have to include client/server software for messaging. Further, the system requirements at the communication terminal are reduced because only a single MMM client is needed for presentation of multimedia messages from multiple services, as opposed to client software for each service.

In accordance with an aspect of the present invention, a method for providing customizable multimedia messages over a television system to a communications terminal for presentation to a user comprises creating a message configuration, and creating an MMM request to a communications terminal for presenting message content to a user according to the message configuration, wherein the MMM request includes the message content and a message configuration expression. The MMM request is sent to the communications terminal over the television system where the message content is presented to the user. The step of creating the MMM request may include a step of including a message configuration expression which comprises the message configuration. Thus, the message content and the message configuration are sent together to the communication terminal as a part of the MMM request. Alternatively, the step of creating an MMM request may include a step of including a message configuration expression which comprises a location reference to the message configuration. Thus, the communication terminal then retrieves the message configuration utilizing the location reference, either from local memory or from another location within the television system. It is also within the scope of the present invention to have the message configuration delivered to the communication terminal from a remote location at the initialization or boot of the communication terminal.

In accordance with another aspect of the present invention, a method for receiving customizable multimedia messages over a television system at a communication terminal for presentation to a user comprises receiving an MMM request at the communication terminal for presenting message content to a subscriber according to a message configuration, wherein the MMM request includes the message content and a message configuration expression. The message content is presented to the user according to the message configuration by the

communications terminal. The method may further comprise retrieving the message configuration from a remote location utilizing the message configuration expression, wherein the message configuration expression comprises a location reference. Alternatively, the message configuration expression may comprise the message configuration, and thus is made available with the MMM request. In addition, the message configuration may be retrieved locally from a memory location in the communications terminal as identifiable by the message configuration expression.

In accordance with yet another aspect of the present invention, a system for providing customizable multimedia messages over a television system to a communications terminal for presentation to a user comprises a multimedia messaging (MMM) server that receives a message configuration and associated message content for presentation to a user according to the message configuration, and generates an MMM request including the message content and a message configuration expression for delivery over the television system to a communications terminal associated with the user. The system further may comprise an MMM client that receives the MMM request and associates the message content and the message configuration for presentation of the message content to the user according to the message configuration. The message configuration expression may comprise a location reference that can be utilized by the MMM client to retrieve the message configuration for use in presenting the message content. Alternatively, the message configuration expression may comprise the message configuration, and thus, the message content and the message configuration may be provided with the MMM request. The system may further comprise a database of message configurations, which is accessible by the multimedia server. The MMM client may include a client application and a configuration manager, wherein the configuration manager generally provides the client application with the message configuration associated with a message content. The MMM client may also include a message database whereby the MMM client records MMM requests that are received. An interface on the communications terminal can make this information available to other services as well as to the user of the terminal via a Graphical User Interface.

In accordance with yet another aspect of the present invention, a system for delivery of multimedia messages comprises an MMM server, a configuration database of predefined message configurations that are accessible by the MMM server, and at least one service

server that generates message content and delivers the message content to the MMM server. In response thereto, the MMM server generates an MMM request that comprises the message content and a message configuration expression. In one embodiment, the service server may be an Emergency Alert System. The message configuration expression may comprise a location reference that can be utilized to retrieve the message configuration, or alternatively, may comprise the message configuration.

Other features and advantages of the present invention will become apparent to one skilled in the art upon examination of the following drawings and detailed description. It is intended that all such features and advantages be included herein within the scope of the present invention as defined by the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can be better understood with reference to the following drawings. The elements of the drawings are not necessarily drawn to scale, emphasis instead being placed upon clearly illustrated principles of the present invention. Furthermore, like reference numerals designate corresponding parts throughout the several views.

FIG. 1 is a block diagram of a multimedia messaging system in accordance with an embodiment of the present invention.

FIGs. 2A-2F are illustrative screen displays that show user interfaces suitable for creation of a multimedia messaging configuration in accordance with an embodiment of the present invention.

FIG. 3 is a block diagram of a communication terminal in accordance with an embodiment of the present invention.

FIG. 4 is a data flow diagram illustrating the operation of a multimedia messaging system in accordance with an embodiment of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are

provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

With reference to FIG. 1, a television system **8** comprises a multimedia messaging (MMM) server **10** and an MMM client **12** in accordance with an embodiment at present invention. The television system **8** may be a cable or satellite television system as are well known in the industry. The television system **8** comprises a headend **16**, a communications terminal **18**, and a network **20** interconnecting the headend **16** and the communications terminal **18**. The network **20** may comprise any suitable transmission medium for establishing one-way and/or two-way communications between the headend **16** and the communications terminal **18**. For example, the network **20** may comprise a hybrid fiber/coax network or a satellite-based network, both of which are well known in the industry.

At the headend **16**, the MMM server **10** is connected to an MMM user interface **22** and a message configuration database **24**. In addition, the MMM server **10** is connected to a broadcast file system (BFS) **26** which delivers various types of data from various servers, preferably located at the headend **16**, to one or more communications terminals **18** via network **20**. A detailed disclosure of a BFS suitable for implementation as BSF **26** can be found in at least U.S. Patent Application No. 09/319,844, entitled "Using A Hierarchical File System for Indexing Data Broadcast to a Client from a Network of Servers," and filed December 12, 1997, the disclosure of which is incorporated herein by reference as is set forth in full. While the MMM server and the associated system elements are illustrated as being located at the headend **16**, it will be appreciated that the MMM server **10** and the other system elements do not have to be located at a headend **16**, but can be remotely located with respect to the headend **16** and/or with respect to one another.

One or more service application servers are interfaced with the MMM server **10** through an MMM server API (Application Program Interface) **28**, which preferably is based on common object request broker architecture (CORBA). For instance, as illustrated in FIG. 1, resident service application servers include an emergency alert system (EAS) server and user interface **30**, a virtual channel server and user interface **32**, a messaging service server and user interface **34**, and a business application support system (BASS) server and user interface **36**. In addition, one or more remote service application servers such as an e-mail

server and user interface **40** may likewise be interfaced with the MMM server **10**. Other services that may be provided by the television system **8** and that may make use of the multimedia messaging of the present invention include, but are not limited to, billing, stocks, or shopping.

In accordance with the present invention, the separate service application servers can utilize the functionality provided by the MMM server **10** and MMM client **12** to create, send and display multimedia messages to a communications terminals **18** for presentation to a subscriber, thereby reducing the overhead associated with each service having messaging client software at the communications terminal **18**. A service can create a message configuration which defines how the message content is presented to the subscribers. The parameters are general enough to support messaging from many different services, such as those provided by the illustrative service application servers depicted in FIG. 1, including EAS notifications from the EAS server **30**, HTML-based virtual channels from the virtual channel server **32**, subscriber messages from the messaging server **34** and e-mail from the e-mail server **34**. A service may submit a request to the MMM server **10** to have specified content presented to a single group or entire population of subscribers according to a specified (or default) message configuration. In response, the MMM server **10** generates an MMM request that is sent to the appropriate communications terminal(s) **18**. The MMM request includes the message content (or a reference thereto) and the message configuration (or a reference thereto). The MMM client **12** process the MMM request, and presents the message content to the user according to the message configuration. Thus, the MMM server **10** and the MMM client **12** provide for application independent messaging by a plurality of services, eliminating the duplication of functions, reducing system complexity and cost, and making more efficient use of system bandwidth.

In accordance with the present embodiment of the invention, the television system **8** may include a service management platform such as that described in U.S. Patent Applications 09/025,577, entitled "System and Method for Providing a Full Service Television System," filed February 18, 1998, and 09/071,550, entitled "System and Method for Providing a Plurality of Programming Services in a Television System," filed May 1, 1998, the disclosures of which are incorporated by reference. This allows the separate service application servers to create MMM requests and have them defined as services

available to the communications terminal user via the navigation framework provided by the terminal's resident service navigator application. Typically this framework involves access to the services via a channel number. In this embodiment, a user of the communications terminal **18** may tune the communications terminal to such a channel which results in the MMM client receiving the pre-defined MMM request already stored in local memory on the terminal.

Examples of the various types of visual content and audio content that may be delivered by the MMM server **10** include a ticker, banner, sprite, barker, animated clip, LED illumination, etc. Examples of specific configuration of the content may include the following: a ticker-taped message scrolling across a portion of a display device associated with the communications terminal **18** with accompanying audio alerting the viewer of severe weather (*e.g.*, a tornado warning); a banner message that pops up in a portion of the display device and including a graphic image and a flashing LED on the communications terminal's front panel alerting the user of e-mail; a pop-up window in the center of the display device telling the user to pay a bill; pages of full-screen HTML formatted text and images displayed on custom background informing the user of upcoming specials on pay-per-view movies; pages of full-screen HTML formatted text with images and accompanying audio instructing the user on how to use various services available on the communications terminal **18**; and a pop-up ticker on a portion of a display device with an accompanying pre-recorded message from another user. Further, the architecture of the MMM framework is such that it can be easily extended to support additional configuration parameters, such as new alerts and display parameters. For example, future developments in HTML, animated image icons, picture-in-picture display modes, and streaming audio may be incorporated into the framework of the present invention.

In accordance with an aspect of the present invention, an MMM configuration comprises a plurality of parameters which are interpreted by the MMM client **12** for defining the various aspects of how the message content is presented to a subscriber. For example, MMM configuration parameters may determine the priority of a message, how the message is triggered, whether or not a channel is forced tuned, how the subscriber is alerted of the message, the size of the message, location of the message on the screen display device, the animation of the visual display, how the subscriber may interact with a visual display, the

sale of the scroll, visual appearance, volume level, relative site of message or a display device, the viewing time, the viewing order, and how often the message is repeated, etc. In an embodiment of the present invention, an MMM configuration can be created by an operator of a service application servers and associated user interfaces **30**, **32**, **34**, **36**, **40**, or alternatively, at the MMM user interface **22**. The MMM configuration parameters may be defined, for example, by the originating service or the operator of the MMM server **10**, set as default based on the message type and/or priority, or by the user of the communications terminal via use configurable parameters. Further, some of the parameters may be set with default values, may be set or overridden by the MMM request or by the profile of the MMM client user.

Exemplary set-up screens for creating an MMM configuration are provided in FIGs. 2A-2F. For example, FIG. 2A provides for the establishment of the urgency associated with the message, FIG. 2B provides for the establishment of a forced tune channel, FIG. 2C provides for the timing associated with the message (including duration, number of times repeated, delayed between repeats, and expiration day/time), FIG. 2D provides for the designation of the type of alert, FIG. 2E provides for the display type, and FIG. 2F provides for the display size.

Once a message configuration has been created using, for instance, the user interfaces of FIGs. 2A-2F, the message configuration can be added to sets of configurations which reside in data files stored in the message configuration database **24**. Alternatively, a message configuration can be added to a data file available to the MMM client **12** via the BFS 26. One such file may be the default message configuration file residing on the BFS 26. The default message configuration file is automatically downloaded by the MMM client **12** upon boot of the communications terminal **18**, and is updated when a file update notification message is received by the MMM client **12** from the MMM server **10**, as described in greater detail below. Alternatively, one or more files containing one or more message configurations each may reside on the message configuration database 24 or BFS 26 for retrieval by the MMM client **12** upon request.

The default message configuration file may include one or more default configurations and is preferably automatically downloaded to the MMM client **12** upon boot of the communications terminal containing MMM client **12**. An example of a suitable

format for a message configuration file, such as the default message configuration file, is provided below in Table 1.

| *Byte* | Field Name | *Length (bits)* | *Range* | Description |
|---|---|---|---|---|
| 0..3 | Version | 32 | | This field indicates the version of this configuration file. |
| 4 | *numConfigs(n)* | 16 | | This field indicated how many configurations reside in this file. |
| | *Index1* | 16 | | This field indicates the first configuration in this file in bytes from the top of the file. |
| | ... | ... | ... | |
| | *Indexn* | 16 | | This field indicates the offset of the last configuration file in bytes from the top of the file. |
| | *Filler* | 0 or 16 | | This field is a filler to cause the configuration data to start on a word boundary byte. |
| 4*x (word boundary) | *<ConfigData 1>* | ... | ... | This field indicates the content of the first configuration. The format of this field is given in the previous table. |
| | ... | ... | ... | |
| 4*y (word boundary) | *<ConfigData n>* | ... | ... | This field indicates the content of the last configuration. The format of this field is given in the previous table. |

TABLE 1

As evident from Table 1 above, multiple configurations may be packed into a single message configuration file, wherein the *numConfigs* field indicates the number of message configurations that are included in the message configuration file.

In accordance with an aspects of the present invention, an MMM request comprises message content provided by the service application server for delivery to the MMM client **12** and a message configuration expression. The message configuration expression may comprise the message configuration, and therefore, both the content and the associated message configuration are delivered to the MMM client **12** together over network **20**. Alternatively, the message configuration expression may comprise a location reference, such as a uniform resource locator (URL), which can be utilized to locate the appropriate message configuration for presentation of the content delivered in the MMM request. If the message

configuration is not included within the MMM request, the message configuration may be stored locally at the MMM client **12**, such as the case if the message configuration were included in the default message configuration download at boot of the communications terminal **18**. Alternatively, the message configuration may reside remotely, such as in message configuration database **24** or BFS **26**, and in which case the MMM client **12** retrieves the message configuration utilizing the location reference from the MMM request. Similarly, the message configuration may include a location reference to the message content, or a portion thereof, rather than the message content itself. This reference may take the form of a Uniform Resource Locator (URL) such as to a file on the BFS.

The MMM request is generated by the MMM server **10** in response to a request to send an MMM request by one of the service application servers. An illustrative format suitable for an MMM request generated by MMM server **10** is provided below in Table 2.

| *Byte* | Field Name | *Length (bits)* | *Range* | Description |
|---|---|---|---|---|
| **0..3** | **MsgId** | 32 | | This field indicates which version of the configuration file should be used. |
| 4 | **DisplayFlag** | 4 | 0..4 | This field specifies the nature of *displayContent* and *displayOffset* fields.<br>0: *df_None* means that there is no text message and the content of the *displayOffset* and *displayContent* fields are not applicable. This is used when there is only an audio message.<br>1: *df_Black* means display a black screen and the content of the *displayOffset* and *displayContent* fields are not applicable.<br>2: *df_HTML* means the content of the *displayContent* field is an HTML file.<br>3: *df_URL* means that the content of the *displayContent* field is a URL location of an HTML file on the BFS server.<br>4: *df_ASCII* means that the content of the *displayContent* field is an ASCII file and a default foreground, background, font, and size will be used to display the message. |
| 4 | ***AudioFlag*** | 4 | 0..2 | This field specifies the nature of *audioContent* and *audioOffset* fields.<br>0: *af_None* means do not override the audio of the current service and the content of *audioOffset* and *audioContent* fields are not applicable.<br>1: *af_Silence* means play silence over the current application and the content of *audioOffset* and *audioContent* fields are not applicable.<br>2: *af_URL* means that the content of the *audioContent* field is the URL location of an audio file. |
| 5 | ***ConfigFlag*** | 1 | 0..1 | This field specifies the nature of *configContent* field.<br>0: *cf_URL* means the content of *configContent* is the name and URL of the configuration to be used with this MMM.<br>1: *cf_Data* means the content of *configContent* is the actual configuration data to be used with this MMM. |
| 5 | ***Reserved*** | 7 | 0 | |

| *Byte* | Field Name | *Length (bits)* | *Range* | Description |
|---|---|---|---|---|
| **6..7** | ***DisplayOffset*** | 16 | | This field specifies the offset of the *displayContent* field in bytes from top of this buffer. |
| **8..9** | ***AudioOffset*** | 16 | | This field specifies the offset of the *audioContent* field in bytes from the top of this buffer. |
| **10..11** | **Reserved** | 16 | 0 | |
| **12...** | **<configContent>** | ... | | This field specifies either the actual configuration data or the name and URL location of the configuration depending on the option given in the *configFlag* field. |
| **4*n... (word boundary)** | ***<displayContent>*** | ... | | This field specifies either the actual HTML MMM or the URL location of the MMM depending on the option given in the *displayFlag* field. |
| **4*m... (word boundary)** | ***<audioContent>*** | ... | | This field specifies the URL location of the audio file if the option in *audioFlag* field is *af_URL*. If it is any other value this field has a length of zero and it is not applicable. |

**TABLE 2**

The *displayFlag* field controls the display of textual content provided in the MMM requests message. If the *displayFlag* field is *df_None*, then there is no visual content for the MMM message, implying that the message is merely an audio message. Under such circumstances, the content of the *displayContent* and *displayOffset* fields are not applicable. If the *displayFlag* field is *df_HTML,* then the displayed visual content is HTML encoded ASCII text, and is included in the *<displayContent>*. Further, the location of the display content is specified by the offset value in the *displayOffset* field. If the *displayFlag* field is *df_ASCII*, then the display content is ASCII text data. The ASCII text is stored in *<displayContent>* field pointed to by the *displayOffset* parameter. In this case, a default foreground, background, font, and size would be used to display the textual message. If the display flag is *df_URL*, then the display textual message is mounted in an URL location. The *<displayContent>* field will give the URL including path and file name. An illustrative format of the *<displayContent>* for *df_URL* is given below in Table 3.

***<displayContent> For df_URL***

| ***Byte*** | ***Field Name*** | **Length (bits)** | **Range** | **Description** |
|---|---|---|---|---|
| ***4*n...*** | **URL** | null terminated | | This field specifies the URL including path and filenames of the text file to be displayed for this MMM. |

**TABLE 3**

The *audioFlag* field controls the audio data content in the MMM request. If the *audioFlag* field is *af_None*, then the MMM client 12 is not to override the audio with the current service, and therefore, the content of the *audioContent* and *audioOffset* fields are not applicable. If the *audioFlag* field is *af_Silence*, then the MMM client 12 is required to override the audio of the current service with silence, and in such a case the content of the *audioContent* and *audioOffset* fields also are not applicable. If the *audioFlag* field is *af_URL*, then the audio data is mounted in a URL location. The *audioContent* field gives a NULL-terminated ASCII string indicating the URL location with path name and file name. An illustrative format of the *audioContent* for *af_URL* is provided below in Table 4.

***<audioContent> For af_URL***

| ***Byte*** | ***Field Name*** | **Length (bits)** | **Range** | **Description** |
|---|---|---|---|---|
| *4*m...* | **URL** | null terminated | | This field specifies the URL of the audio file to be played for this MMM. |

**TABLE 4**

The *configFlag* field controls the configuration data content in the MMM request message. If the *configFlag* field is *cf_Data,* then the *<configContent>* field contains the actual configuration data to be used with the message. An illustrative format of the message configuration is provided below in Table 5.

***<configContent> For cf_Data***

| Byte | Field Name | Length (bits) | Range | Description | Release 1.1 |
|---|---|---|---|---|---|
| 0 | Priority | 4 | 0..15 | This field determines the priority of an MMM. | NA(0) |
| 0 | AcOutlet | 1 | 0..1 | This field determines whether to turn on the DHCTs when an MMM is arrived.<br>**0: ao_Ignore causes no changes to the AC outlet. <Default>**<br>1: ao_On turns on the DHCTs. | NA(0) |
| 0 | ForceTune | 1 | 0..1 | This field determines whether to activate a service Id defined in the forceTuneServiceId field.<br>**0: ft_None means no changes in the current service and forceTuneServiceId field is not applicable. <Default>**<br>1: ft_ServiceId means activate the service specified in forceTuneServiceId field. | |

| Byte | Field Name | Length (bits) | Range | Description | Release 1.1 |
|---|---|---|---|---|---|
| 0 | Immediacy | 1 | 0..1 | This field determines when an MMM should be activated/displayed.<br>0: imd_Immediate means activate the service Id or display message immediately upon arrival. If this option is selected, the triggerKey field is not applicable.<br>1: imd_KeyPress means that do not activate service Id or do not display the message until the user presses the trigger key defined by the triggerKey field. | NA(0) |
| 0 | Reserved | 1 | 0 | | |
| 1 | Repeats | 8 | | This field determines number of times which an MMM is repeated. | |
| 2..3 | ForceTuneServiceId | 16 | | This field determines the service ID to be activated when an MMM is arrived, if the option ft_ServiceId is selected in the forceTune field. | |
| 4..5 | DelayBetweenRepeats | 16 | | This field determines time in seconds between each MMM repetition. | |
| 6 | TriggerKey | 8 | 0x00-0x2E & 0x40 | This field determines the trigger key. 0x40 means any key. | NA (0x00) |
| 7 | EnablePageKeys | 1 | 0..1 | This field determines whether a page key can be used to page up and down through an MMM.<br>0: epk_No means disallow use of the page keys.<br>1: epk_Yes means allow use of page keys. | NA(0) |
| 7 | EnablePageMinus | 1 | 0..1 | This field determines whether a page - key can be used to go to the previous page.<br>0: ep_No means disallow use of the page - key.<br>1: ep_Yes means allow page - key | NA(0) |
| 7 | RollOver | 2 | 0..3 | This field determines whether the pages should be rolled over from hi to low and low to hi with the + key.<br>0: roll_None means do not roll from high to low or low to high.<br>1: roll_HiToLow means allow rollover from hi to low but not from low to hi.<br>2: roll_LowToHi means allow rollover from low to hi but not from hi to low.<br>3: roll_Both means allow rollover from hi to low and low to hi. | NA(0) |

| Byte | Field Name | Length (bits) | Range | Description | Release 1.1 |
|---|---|---|---|---|---|
| 7 | DisplaySize | | 0..15 | This field specifies the size of display.<br>0: ds_FullScreen means full screen <NA><br>1: ds_1LineBottom means one line at the bottom. <NA><br>2: ds_2LineBottom means two line banner. <NA><br>3: ds_3LineBottom means three lines at the bottom.<br>4: ds_1LineTop means one line at the top. <NA><br>5: ds_2LineTop means two lines at the top. <NA><br>6: ds_3LineTop means three lines at the top.<br>7: ds_TopHalfScreen means top half screen. <NA><br>8: ds_BottomHalfScreen means bottom half screen. <NA><br>9: ds_CenterScreen means center part of the screen. <NA><br>10: ds_Custom allows the user to specify their coordinates in the displayCoords fields. <NA> | NA(3) |
| 8 | DisplayMotion | 2 | 0..2 | This field specifies the motion of the text.<br>0: dm_Fixed means no motion. <Default><br>1: dm_ContinuousScroll means scroll the entire textual message using the motionDirection and motionSpeed fields.<br>2: dm_DelayedScroll means scroll the textual message in pieces, using the motionDirection, motionSpeed, and motionDelay fields. <NA> | NA(0) |
| 8 | MotionDirection | 2 | 0..3 | This field specifies direction of scrolling.<br>0: md_ScrollUp means scroll up.<br>1: md_ScrollDown means scroll down. <NA><br>2: md_ScrollLeft means scroll left.<br>3: md_ScrollRight means scroll right. <NA> | NA(0) |
| 8 | MotionSpeed | 2 | 0..3 | This field specifies speed of scrolling.<br>0: ms_Instant doesn't actually scroll but rather replaces (only valid with dm_DelayedScroll) ;<br>1: ms_Slow<br>2: ms_Medium<br>3: ms_Fast | |
| 8 | Reserved | 2 | 0 | | |
| 9 | Reserved | 8 | 0 | | |
| 10..11 | MotionDelay | 16 | | delay in seconds between scrolling of message pieces during dm_DelayedScroll. | NA(0) |
| 12..13 | PageKeyRepeatPeriod | 16 | | This field determines time in milliseconds between page changes with a page key held down . | NA(0) |
| 14..15 | DisplayCoordsXMin | 16 | | x min display window on screen. | NA(0) |
| 16..17 | DisplayCoordsYMin | 16 | | y min display window on screen. | NA(0) |
| 18..19 | DisplayCoordsXMax | 16 | | x max. display window on screen. | NA(0) |

| Byte | Field Name | Length (bits) | Range | Description | Release 1.1 |
|---|---|---|---|---|---|
| 20..21 | DisplayCoordsYMax | 16 | | y max. display window on screen. | NA(0) |
| 22 | Reserved | 4 | | | |
| 22 | MessageAlert | 4 | 0..5 | This field determines how a subscriber is notified when an MMM is arrived:<br>0: ma_None means no alert is given;<br>1: ma_Text means text defined in the alertContent field is displayed and use a default set of foreground, background, size, and font.<br>2: ma_Light means that message LED will be turned on;<br>3: ma_HTML means display the HTML file defined in the alertContent field.<br>4: ma_Tboth means display both alertContent field and message LED; and the content of the alertContent is an ASCII file and use default background, foreground, size, and font.<br>5: ma_Hboth means display both alertContent field and message LED; and the content of the alertContent is an HTML. | NA (0) |
| 23 | AlertLEDRate | 8 | | This field determines the rate of LED blinking in cycles per second. This field is only applicable for the options of ma_Light, ma_HBoth and ma_TBoth in the messageAlert field. | NA |
| 24 | AlertLEDDuration | 8 | | This field determines the length in seconds of the interval during which blinking occurs. This field is only applicable for the options of ma_Light, ma_HBoth and ma_TBoth in the messageAlert field. | NA |
| 25 | AlertLEDPeriod | 8 | | This field determines how often in seconds the blinking interval is repeated. This field is only applicable for the options of ma_Light, ma_HBoth and ma_TBoth in the messageAlert field. | NA |
| 26..27 | AlertLength | 16 | | This field determines the length of the alertText field. | NA(0) |
| 28..29 | Reserved | 16 | | | |
| 30.. | AlertContent | ... | | This field determines a 2-line text if the messageAlert field is either ma_Text , ma_HTML, ma_TBoth, or ma_HBoth. | NA |

TABLE 5

Of particular interest, the *messagealert* field may define modes of notification, some of which are operable when the communications terminal **18** is turned off and the same and/or others when the terminal **18** is turned off. If the terminal **18** is off, then one of the modes of alert may be to force the terminal **18** on and then a visual and/or audio message is played. Regardless of the mode, there are essentially three sources of the data for the alert, such as an animated clip for play on a display device at a single location, multiple location,

or moving. The data may be stored locally, received with the MMM request, or retrieved from an identified location (such as with a URL).

If the *configFlag* field is *cf_URL*, then the *<configContent>* field specifies the name and URL location of the configuration data file which includes the message configuration to be used with this message. An illustrative format of this *<configContent>* is provided below in Table 6.

***<configContent> For cf_URL***

| *Byte* | *Field Name* | Length (bits) | Range | Description |
|---|---|---|---|---|
| *12...* | **Name** | null terminated | | This field specifies the configuration to be used with this MMM. |
| ... | **URL** | null terminated | | This field specifies the URL of the configuration file to be used with this MMM. |

**TABLE 6**

The URL field includes the path and file name specifying the location of the message configuration file. The Name field indicates the configuration data content to be used with the message. Thus, one or both of the *configFlag* field and the *<configContent>* comprise the message configuration expression.

Once the MMM request has been generated by the MMM server 10, it is delivered over the network 20 to the communications terminal 18. This may be achieved by physically sending a message using the facilities of the cable or satellite system. In the present embodiment this is mechanism uses the DSM-CC User-to-Network Pass-Thru Messaging standard based on the MPEG-2 standard. Alternatively, an MMM request may be defined and delivered using the service management facilities of the cable or satellite system. In an exemplary embodiment, a service includes an application and a parameter, as discussed in U.S. Patent Application Nos. 09/025,577 and 09/071,550, which are cited above. Other System Information standards include ATSC SI (A/56 and A/65), SCTE DVS-234, and the applicable DVB standard. For MMM, a service consists of the MMM client **12** as the application and the MMM requests as the parameter. This service can be assigned to a channel and activated when the user tunes the communications terminal **18** to that channel.

With reference to FIG. 3, an MMM client **12** in accordance with an embodiment of the present invention as illustrated. The MMM client **12** is configured to process MMM request and MMM configuration updates. The MMM client **12** comprises an MMM client application **50**, an MMM configuration manager **52**, an MMM client database **54**, and an MMM client user interface **56**. In addition, associated with the communications terminal **18** is a user interface device **58** which may include a display device, speakers, or other devices suitable for delivery of the message content to the subscriber. An input device **60** is provided for delivering user inputs to the communication terminal **18**, and more particularly, to the MMM client **12**.

The MMM client application **50** receives and processes the MMM configuration update requests and MMM requests. When an MMM configuration update message is received from an MMM server **10**, the MMM client application **50** decides whether or not to load the new message configuration data based on the version number provided. If the MMM client application **50** decides to update the default message configuration, then they will read the file from the BFS **26** and delivers the data to the MMM configuration manager **52**. In addition, the MMM client application **50** may retrieve message content data such as audio files or text files from the BFS **26** as necessary to fulfill the request of the MMM request.

When an MMM request is received, the MMM client application **50** is activated and any MMM request data (*e.g.*, message configuration and/or message content) associated with the MMM request but not included with the MMM request is retrieved, such as audio content or message configuration content from the BFS **26**. The MMM request data is then parsed and processed by the MMM client application **50**. If the MMM request is a forced tune message, *i.e.*, an EAN message, then the MMM client **12** will save and suspend the currently viewed service, and activate a new service according to the service ID provided by the MMM request. The forced tune message preferably can only be terminated by a termination message sent by the MMM server **10**, or by turning off the communication terminal **18**.

The MMM configuration manager **52** manages the default message configuration file downloaded at boot and the message configuration data downloaded with the MMM request or otherwise retrieved in response to an MMM request. The MMM configuration manager **52** also tracks the latest version of the default configuration file residing in the MMM client

database **54**. In the MMM client database **54**, the MMM configuration manager **52** stores MMM configuration files downloaded during operation. The MMM configuration manager **52** retrieves the configuration files when appropriate for use by the MMM client application **50**. As discussed above, the default configuration files can be downloaded at boot from the BFS **26** or they can be downloaded directly to the MMM configuration manager **52**, while configuration files received as a part of an MMM request are provided to the MMM configuration manager **52** via the MMM client application **50**.

While the MMM request typically comes from the MMM server **10**, an MMM request can be generated from other sources within the system **8**. For example, an MMM request can be generated when the subscriber tunes a channel using the resident service navigator that provides a service navigation user interface **62**, which issues a request for service to the service navigator **64**. The service navigator **64** then generates an MMM request that is sent to the MMM client **12** where it is processed in substantially the same manner as an MMM request from the MMM server **10**, as described above.

Accordingly, as an MMM request is received by the MMM client application **50**, the MMM client application **50** parses the MMM request, retrieving the display, audio, message configuration data, for example, off the BFS **26** if not included directly with the MMM request. The parameters of the message configuration are examined to determine which display and audio components are necessary for presentation of the multimedia message. Depending on the MMM configuration, the user may be notified visually or audibly of the message arrival. The user may actually have to trigger the message presentation, depending upon the message configuration. The relevant visual and audio content is then passed to the display and audio components of the interface device **58** so that the subscriber is presented with the multimedia message.

As previously mentioned, the MMM configurations define the presentation of the message to the user via the user interface device **58**. While these parameters are defined by an MMM configuration, one or more of the parameters may be overridden by parameter preferences included in the request or by a client profile, which is a user defined selection of parameters that are preferred by the user. For example, a client profile may define that text messages be presented as a ticker tape and all audio messages be accompanied by an illuminated LED. Preferably, the parameter preference of the client profile are defined based

on the message type and priority. The parameters of the client profile, which is preferably stored locally to the MMM client **12**, is executed by the MMM client application **50**, and may override the parameters from the designated MMM configuration or from the MMM request. This provides user customized notification and presentation of a message.

With reference to FIG. 4, the operation under several scenarios of an MMM system in accordance with an embodiment of the present invention is provided. For example, the default message configuration file is created with all of the designated default message configurations and placed on the BFS **26** during the boot of the MMM server **10**, as indicated by CreateFile step **80**. When the communication terminal 18 boots the MMM client reads the default message configuration file from the BFS 26, as indicated by the ReadFile step **82**.

The creation of a message configuration can be initiated by an operator at a service application server or the operator can create an message configuration via the MMM server user interface **22**. When the message configuration is defined, it is sent to the MMM configuration database **24** via the MMM server **10**, as indicated by the CreateMMMConfig step **84** and StoreConfig step **86**. Alternatively, the new message configuration file may be placed on the BSF **26** for retrieval by the MMM client **12**, as indicated by the CreateFile step **88**. Once the message configuration file is updated, the MMM server **10** sends the updated configuration file to the appropriate locations, such as the BSF **26**. A notification is sent to the MMM client **12** notifying the MMM client that a message configuration has been updated, as indicated by MMMConfigUpdate step **90**. In response, the MMM client **12** determines if the updated message configuration should be downloaded, and if so, then reads the updated message configuration from the BFS **26**, as indicated by ReadFile step **92**.

When a system operator or a service application server wishes to send a message, the message content is created if not already in existence. This may involve the creation of HTML, audio content, or simple text, all of which may be stored as files on the BFS **26**, as indicated by the CreateMessageContent step **94** and CreateFile step **96**. Once the content is created, an MMM request is created by the MMM server **10** to send the message (*i.e.*, the content) using a defined message configuration. This is done by a SendMMMRequest to the MMM server **10**, as indicated by the SendMMMRequest step **98**. If the specified message configuration of the MMM request is not available on the BSF **26** or in the local default message configuration file, then the MMM server can include the configuration data in the

MMM request message that is delivered over the network **20** to the MMM client **12**, as indicated by MMMRequest step **102**. When the MMM client **12** receives the MMM request, the MMM client **12** may need to load the MMM configuration and/or content such as from the BSF **20**, as indicated by the ReadFile step **104**. The MMM client then processes the message according to the message configuration for presentation via the user interface device **58**, as indicated by Display Message step **106**.

An MMM request can also be based on a communication initiated by the subscriber selecting a channel which provides an already defined MMM service, as indicated by the TuneChannel step **108** and RequestService step **110**. In this case, the MMM request comes from the service navigator 62, as indicated by MMM request 112. The MMM client then process the MMM request in substantially the same way as an MMM request from the MMM server 10, and discussed above.

Many modifications and other embodiments of the invention will come to mind to one skilled in the art to which this invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.